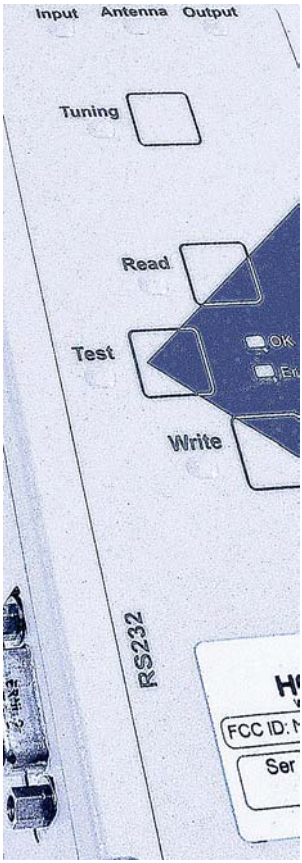

User Manual
RS232 Transponder Reader

(Serial/ASC-I1)

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1 INTRODUCTION

1.1 About this Device

The BROOKS Transponder Reader System is a high-frequency identification system that uses FM transmission.

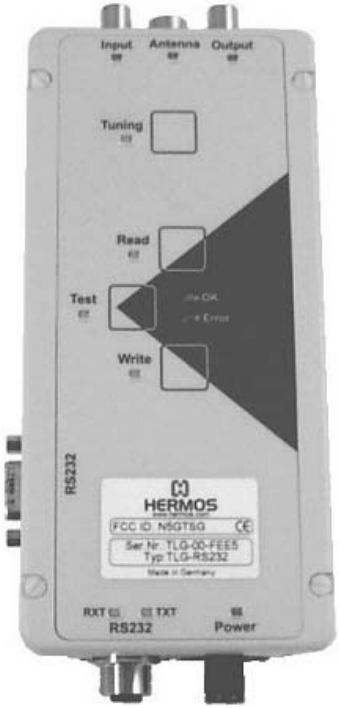
The basic item is a transponder that works as a forgery-proof electronic identity disk.

The reading unit of the system sends an energy impulse via the antenna. The capacitor of the passive, battery-free transponder is charged by this impulse. After that, the transponder returns a signal with the stored data.

The total reading cycle takes less than 100 ms.

As a sight connection between the transponder and the reader is not absolutely necessary, the transponder can also be identified through non-metallic material.

The data received by the transponder reader are transmitted via the serial interface.



1.2 About this Manual

This manual contains information about installing, operating and error handling the BROOKS RS232 Transponder Reader. It consists of eight chapters:

- Introduction
- Safety Instructions
- Product Description
- Installation
- Operation
- Service and Error Handling
- Deinstallation and Storage
- Transportation and Disposal
- Accessories

2 SAFETY INSTRUCTIONS

This product is manufactured in accordance with state of the art technology and corresponds to recognized safety regulations. Nevertheless, there are dangers associated with the use of the equipment even for its intended purpose. You should therefore read the following safety information carefully and keep it in mind.

Only install and operate this equipment if it is in perfect condition and with reference to this manual. Do not use the equipment if it is damaged.

2.1 Symbols and Types Used in this Manual

	This symbol alerts you to dangerous voltage
	This symbol alerts you to important instructions
	This symbol indicates electromagnetic radiation
	This symbol alerts you to risk of explosion
	This symbol alerts you to risk of fire
☞	This symbol indicates important additional information
	Electrostatically sensitive components
13:44:33 **Incoming:** **ENQ (05)**	This type represents transmitted data display

2.2 General Safety Instructions

1 Read and understand all safety and operating instructions before installing and operating the device.

2 This instruction is designed for specially trained personnel. This device is NOT intended for use by the “general population” in an uncontrolled environment. Installation, operation and error handling the device shall be carried out by specially trained personnel only (see additional information on pages 12, 25, 36, and 61).

3 Keep these instructions. Store this manual in a place that can be accessed at any time by all persons involved in installing, operating and error handling the device.

4 Heed all warnings. Follow all warnings on and inside the device and operating instructions.

5 Install in accordance with the manufacturer's instructions only.

6 Only use attachments, accessories and connecting cables supplied by the manufacturer.

7 All error handling other than the error handling listed in chapter 6 of this manual must be carried out by the manufacturer.

8 People with hearing aids should remember that radio signals transmitted by the device might cause a very unpleasant buzzing noise in their hearing aids.

9 Do not connect the device to any kind of power supply such as a standard household power supply. The device should be connected to a power supply of the type described in these instructions only.

10 When you disconnect a cable, pull on its conductor and not on the cable itself. Keep the connector evenly aligned to avoid bending any connector pins. When you connect a cable, ensure that the connector pins are positioned correctly.

11 Never over bend the antenna cable or expose it to mechanical loads.

12 When replacement parts are required, use the replacement parts specified by the manufacturer only. Unauthorized substitutions may result in fire, electric shock, or other hazards.

All antenna resonant circuit components carry high voltage!

The installer is responsible for installing the device to comply with FCC requirements of human exposure to radio frequency.

To prevent fire, shock hazard, or annoying interference, use recommended accessories only.

When removing the housing lid, note that the housing lid is connected to the case with a cable. Remove the lid carefully to prevent damage - do not pull it! Do not operate the device when the housing lid is removed!

Do NOT operate this device without a proper antenna attached. Proper antennas are antennas supplied by the manufacturer and listed in section „Accessories“.

Never locate the antenna so that it is very close to or touching parts of the body while transmitting.

2.3 ESD Instructions

Static electricity can harm electronic components inside the device. All persons who install or maintain the device must be trained in ESD protection. ESD protection measures must be observed when opening the device.

- ☞ **Before removing or inserting components, disconnect the power supply.**
- ☞ **To prevent electrostatic damage, static electricity must be discharged from the body and tools before touching components inside the device.**
- ☞ **Touch electro sensitive components carefully at their edges only.**

2.4 Proper Use

This product was developed for reading and writing the TIRIS® transponder only. Any other use of this device would constitute abuse

and would render the user's authority to install and operate the device invalid.

This product is designed to be mounted and operated in an industrial environment as a built-in-device only. It is not designed to be used as a stand-alone or a portable device or in a non-industrial environment, such as a household, vehicle or open-air environment.

2.5 Qualified Personnel

This manual is designed for specially trained personnel only. This device must be installed and maintained by the manufacturer or its specially trained representatives.

Intervention or error handling not expressively approved in this manual must be carried out by the manufacturer's personnel only. If you are unsure about the qualifications that are actually required, contact the manufacturer.

Unqualified interventions may result in personal injury or damage to the device!

2.6 Declaration of Conformity

2.6.1 USA – Federal Communications Commission (FCC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference and
2) This device must accept any interference received, including interference that may cause undesired operation.

☞ **This equipment has been tested and found to comply with the limits for a Class B digital device, in accordance with part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.**

☞ **This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception – this can be determined by turning the equipment off and on – the user is encouraged to try to correct**

the interference using one or more of the following measures:

—Reposition or relocate the receiving antenna.

—Increase the distance between the equipment and the receiver.

—Connect the equipment to an outlet to a circuit other than the one to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for assistance.

FCC ID: N5GTSG

Compliance with:

FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.205

FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.209

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

2.6.2 Europe – CE Conformity

CE 0682 ⓘ

Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)

Declaration of Conformity in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/FC (R&TTE Directive)

Hersteller / Verantwortliche Person *Manufacturer / responsible person*	**BROOKS Automation (Germany) GmbH / Herr Dittrich**
erklärt, dass das Produkt *declares that the product*	TLG RS232
Type (ggf. Anlagenkonfiguration mit Angabe der Module): *Type (if applicable, configuration including the modules)*	

☑ Telekommunikations(Tk-)end-einrichtung *Telecommunications terminal equipment*	Funkanlage *Radio equipment*
Verwendungszweck *lntended purpose*	**Identification system**
Geräteklasse */ Equipment class*	**2**

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of §3 and the other relevant provisions of the FTEG
(Article 3 of the R&TTE Directive), when used for its intended purpose.

Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a))
Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a))

angewendete harmonisierte Normen *Harmonized standards applied*	**EN 60950**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards/ Spezifikationen) *Other means of proving conformity with the essential requirements (standards/specifications used)*	**BMPT Decree No. 306/97**

Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit (§ 3 (1) 2, Artikel 3 *(1) b)*
Protection requirements concerning electromagnetic compatibility § 3(1)(2), (Article 3(1)(b))

angewendete harmonisierte Normen *Harmonized standards applied*	**ETS 300 683**

Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards / Spezifikationen)
Other means of proving conformity with the essential requirements (standards/specifications used)

Maßnahmen zur effizienten Nutzung des Funkfrequenzspektrums
Measures for the efficient use of the radio frequency spectrum

Luftschnittstelle bei Funkanlagen gemäß § 3(2) (Artikel 3(2))
Air interface of the radio systems pursuant to § 3(2) (Article 3(2))

Angewendete harmonisierte Normen
Harmonized standards applied

Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards / Schnittstellenbeschreibungen)
Other means of proving conformity with the essential requirements (standards/interface specifications used)

I-ETS 300 330

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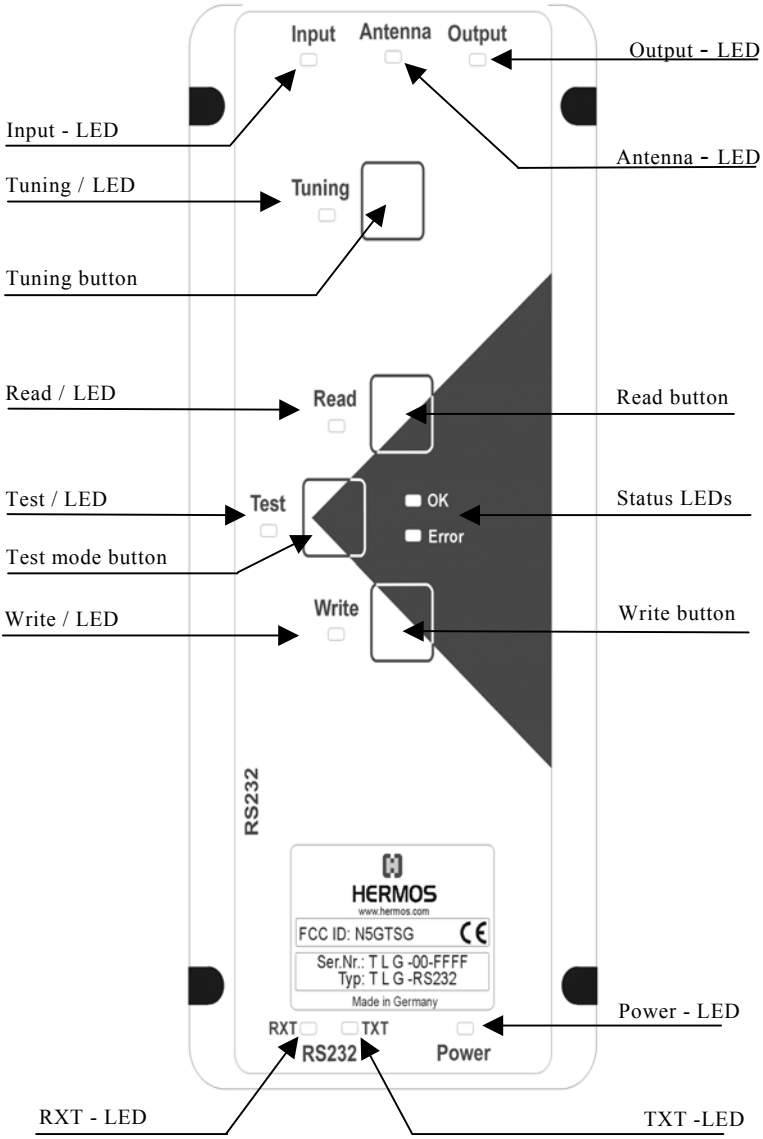
Mistelgau, 15.09.2004 — Gerald Dittrich

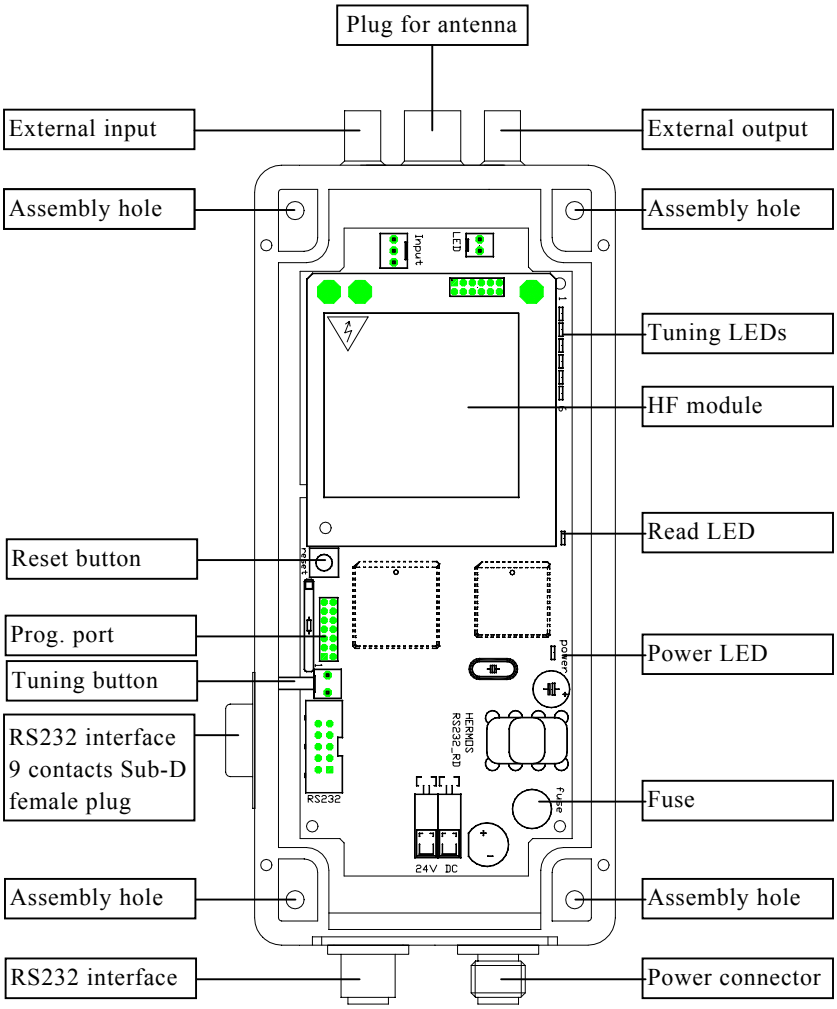
(Place and date of issue) — (Name and signature)

3 PRODUCT DESCRIPTION

3.1 Indicating and Operating Elements



3.2 Inside View



3.3 Description

Power LED

If the device is connected to a power supply, the LED is illuminated green and the reader is ready for use.

HF module

The HF module is the analog part of the device. It triggers the antenna and transmits the received data to the controller.

Six tuning LEDs

The six tuning LEDs show the switch status of the adjustment relays

RS232 interface

The data are passed down serially to one of the two **RS232 interfaces** (9 contact Sub-D female plug) with the different protocols. Baud rates of 300 Bd up to 115.2 kBd are possible.

Tuning pushbutton

The reader starts an automatic antenna tuning.

Read LED

The read LED is illuminated green for a short while if the device tries to read or write.

Programming port

The programming port is scheduled for service purposes.

External output

The external output, usually a LED, shows the switch status of the device (software-dependent).

External input

A sensor (such as an optical sensor) can be connected to the external input.

Fuse

TR5 housing, 500 mA T (low breaking).

Tuning LED

The antenna's efficiency is optimized by pushing the automatic calibration key. The LED is illuminated during the calibration process and subsequently goes out when tuning is successful. If a fault occurs, the LED remains on until the next calibration process is successful.

Possible faults could be caused by a defect antenna or a strong metallic surrounding at the antenna.

Antenna LED

If the antenna sends HF signals (to load a transponder or send data, for example), the LED is activated for this period.

Input LED

The input LED indicates that the external sensor was initiated or that an external potential-free contact was actuated.

Output LED

If the external output is set, the LED is on; if not, the LED is not illuminated.

RXT and TXT LED

When data are transmitted via the RS232-interface, the corresponding transmit or receive LED is illuminated.

TXT-LED (transmit):	Data are transmitted from the reader to the terminal.	R → T
RXT-LED (receive):	Data from the terminal are received in the reader.	R ← T

Test LED

The test mode is used to check the most important reader features (reading or writing), which are operated by pushing the corresponding key in test mode.

To switch the reader to test mode, press the test key for longer than 5 seconds. The test LED is flashing when the reader is in test mode.

Push the test key again to leave the mode.

Read and Write LED

If the test mode is activated, you can make the reader read or write (polling) permanently by pressing the read or write key. This state is indicated by a LED next to Read or Write.

By pressing the key that is not activated currently, the device changes its state from Read to Write and vice versa.

If you press the key that is already activated, this exits polling mode and the Read or Write LED goes out.

If the reader is in one of these two states, the status LEDs display whether the process was successful (green OK) or not (red ERROR).

If the reader attempts to write and both LED's (the green 'OK' LED and the red 'ERROR' LED) are on, the reader would be able to write but the transponder is locked.

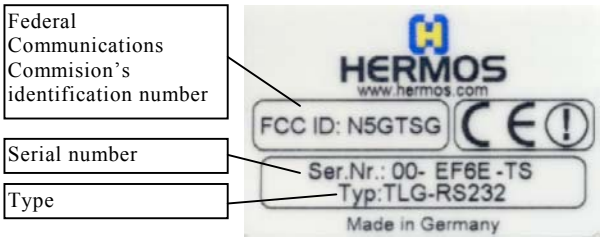
External Output (LED)

Normally, a LED is connected to the external output that is only relevant when combined with a read or write action.

The LED remains until the read operation is complete. The LED goes out if the reader receives a confirmation that the page was read, or if an error message occurs.

If the host does not return a confirmation after the page was read, the LED remains on until either a new read process is started and successfully completed, or until the device is reset.

3.4 Labeling Information



3.5 Technical Data

3.5.1 Transponder Reader

Parameter	Value
Operation temperature	0°C to +50°C 32°F to 122°F
Stock temperature	-25°C to +70°C -13°F to +158°F
Permissible humidity @ 50C°	25 - 80 %
Transmitter frequency	134.2 kHz
Max. transmitting level in 3m distance	104 dBµV/m
Typ. period of charging impulse	50ms
Max. repeat of reading	4/s
Max. repeat of programming	1/s

Protection mode	IP 40
Housing material	ABS (UL94-V0)
Weight (with rod antenna and presence sensor)	about 440g / 15.4 oz
Fuse type TR5	500mA (T)
Serial interface RS232	300 Bd – 115,2 kBd

3.5.2 Power Supply and Current Input

Description	Min	Type	Max	Unit
Voltage (proof against connecting to the wrong terminal)	18	24	30	VDC
Current with/without presence sensor (starting process excluded)		30 / 55		mA
Reading/writing impulse Rod antenna without/with presence sensor		160 / 185		mA
Micro antenna without/with presence sensor		140 / 165		mA

3.5.3 Antenna Cable

3.5.3.1 Cable of Rod Antenna and Frame Antenna

Standard cable:

Diameter:	5.6 mm
Bending radius:	84.0 mm, If the cable is bent only once and then laid fix a bending radius of 33 mm is allowed
Material:	PVC
Approvals:	VDE, IEC

Highly flexible cable (suitable for energy chains):

Diameter:	6 mm
Bending radius:	60 mm
Material:	PVC
Approvals:	VDE, IEC, UL

3.5.3.2 Cable of Mini Antenna and Micro Antenna

Standard cable:

Diameter:	4.1mm
Bending radius:	41 mm, If the cable is bent only once and then laid fix a bending radius of 20.5 mm is allowed
Material:	PVC
Approvals:	VDE, IEC, UL

Highly flexible cable (suitable for energy chains):

Diameter:	5 mm
Bending radius:	50 mm
Material:	PVC
Approvals:	VDE, IEC, UL

Special antennas with other highly flexible cables are available upon request.

3.6 Contents of Delivery

Number	Description
1	RS232 Transponder Reader
1	Mounting set
1	Instruction manual
1	Accompanying letter

☞ **For available or required accessories, e.g. antennas, adapters and cables, see section "Accessories" on page 68 in this manual.**

3.7 Warranty and Liability

The warranty period is 24 months and begins with the moment of delivery of the device as proved by an invoice or other documents.

The warranty includes the repair of all damages to the device that occur within the warranty period, and which are evidently caused by faults of the material or production defects.

The warranty does not include damages caused by incorrect connection, inappropriate handling and non-observance of the technical reports.

4 INSTALLATION

4.1 Installation Environment

This device is designed for use in an indoor industrial environment only. Installation is only permitted in an environmental indoor climate with a constant temperature of between 0°C and +50°C / 32°F and 122°F, humidity between 25% and 80%, and a maximum temperature of +50°C / 122°F.

Do not install or use this device in or near water. Never spill liquids of any kind onto the device. Should spillage occur, unplug the device and have it checked by a technician.

Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not install the device in a flammable environment.

Never expose the device to intense changes in temperature, otherwise condensation can develop inside the device and cause damages.

Do not locate the device near overhead power lines or other electric lights, or power circuits or where it can encounter such circuits. When installing the device, take extreme care not to encounter such circuits as they can cause serious injury or death.

The device should not be used in the immediate vicinity of electrical units (such as medical units, monitors, telephones, televisions and energy-saver lamps), magnetic data carriers, or metallic objects. This could result in reduced reading/writing ranges.

Never use the device in potentially explosive areas (such as paint shops).

Do not position the device in a location where it can suffer from vibration or shock.

When the device is installed, the installation location must be adequately illuminated.

Do not install the device during periods of lightning.

Ensure the installation location complies with FCC requirements for human exposure to radio frequency.

☞ When determining the assembly location, consider the length of the antenna cable that will be used, and the reading and writing range. See section „Accessories/Antennas“ for further information.

4.2 Qualified Installation Personnel

The installation shall be carried out by specially trained personnel only. If you are uncertain about the qualification, contact the manufacturer.

Operating the device without special skills can result in damage to the reader and/or connected devices!

4.3 Unpacking

This device and its accessories were packed under clean room conditions. To preserve these conditions, the device must be unpacked under clean room conditions.

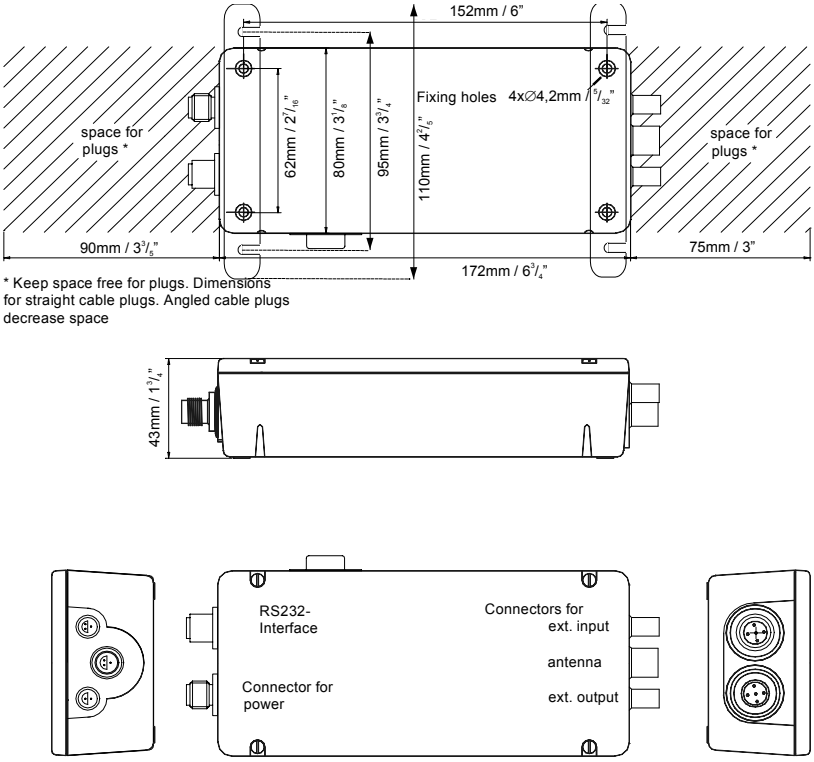
4.3.1 Disposal of Packing Material

The packing material consists of cardboard and film. Dispose of these materials separately in accordance with the relevant legislation in your country.

4.4 Mounting the Transponder Reader

☞ **The mounting surface must be stable, non-flammable, dry and clean. If necessary, clean it before installing the device.**

4.4.1 Dimensions for Planning


152mm / 6"
space for plugs *
62mm / 2 1/16"
80mm / 3 1/8"
95mm / 3 3/4"
Fixing holes 4x∅4,2mm / 3/32"
110mm / 4 2/5"
space for plugs *
90mm / 3 3/8"
75mm / 3"
172mm / 6 3/4"
* Keep space free for plugs. Dimensions for straight cable plugs. Angled cable plugs decrease space
43mm / 1 3/4"
RS232-Interface
Connectors for ext. input
antenna
ext. output
Connector for power

4.4.2 Standard Housing Using Enclosed Assembly Material (Recommended)

4.4.2.1 Required Materials and Tools

- Enclosed mounting set, containing two mounts, four expanding rivets and a drilling template
- Four cylinder head screws: M4 (EU)
  UNC 8/32 (USA)
- Four dowels (in case of wall mounting)
- Appropriate screwdriver
- Drilling machine with fitting drill

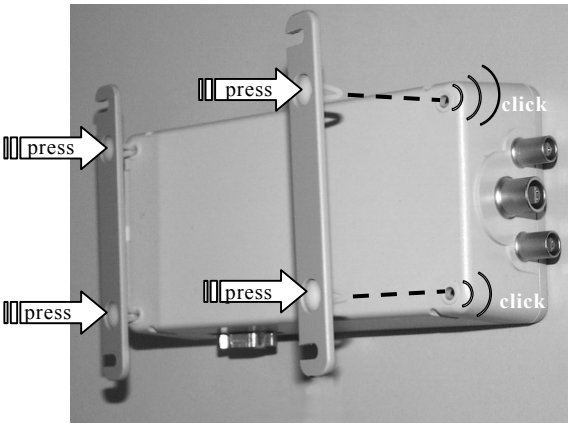
4.4.2.2 Assembly

1 Drill four holes, using the enclosed drilling template.

2 When mounting the device on a wall, insert four dowels.

3 Insert four expanding rivets to the two mounts as shown on the image.

4 Plug the mounts into the four mounting holes of the device as shown on the picture.



5 Screw the device onto the assembly surface.

6 Connect the device as described in section “Connecting” (page 33).

4.4.3 Housing without Mounts

If you intend to install the device without mounts, you will have to remove the housing lid.

Static electricity can harm electronic components inside the device. Follow the ESD instructions (see page 11) when you open the device!

When removing the housing lid, note that the housing lid is connected to the case with a cable. Remove lid carefully to prevent damage – do not pull it!

4.4.3.1 Required Materials and Tools

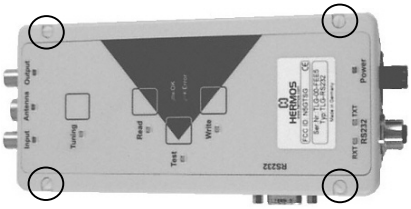
- Four cylinder head screws: M4 (EU)
  UNC 8/32 (USA)
- Four dowels (in case of wall mounting)
- Appropriate screwdriver
- Drilling template (enclosed)
- Drilling machine with fitting drill

4.4.3.2 Assembly

1 Drill four holes, using the enclosed drilling template.

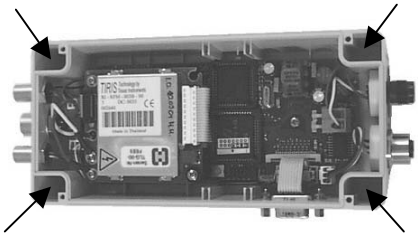
2 If you are mounting the device on a wall, insert four dowels.

3 Unscrew the four housing lid screws.



4 Carefully remove the lid.

5 Screw the device onto the assembly surface using the four assembly holes inside the case.



6 Screw the housing lid back onto the device.

7 Connect the device as described in section 4.6.

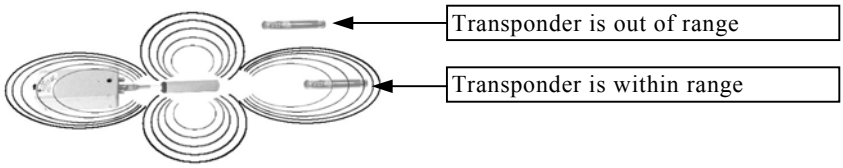
4.5 Installing the Antenna

☞ **When installing the antenna, consider the required reading and writing ranges (see section "Accessories", page 68). The reader can be used properly only if the transponder is located within the individual reading/writing range of the antenna!**

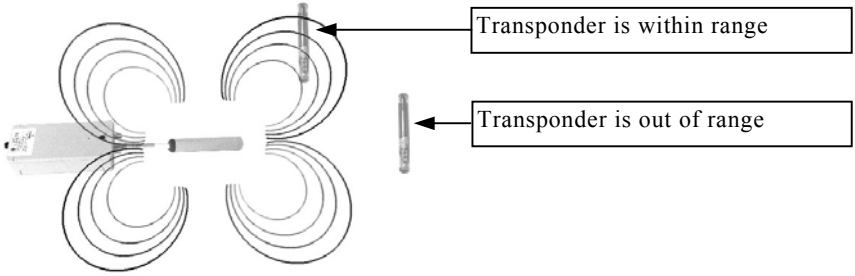
4.5.1 Positioning

Reliable reading and writing depends on the range and position of the transponder to the antenna.

Transponder parallel to the axis of the antenna:

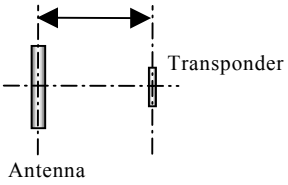


Transponder perpendicular to the axis of the antenna:



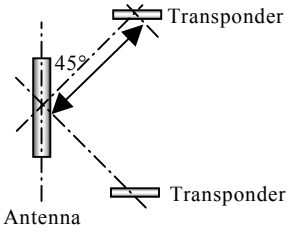
Parallel

The illustration shows the optimal position of the transponder if it is positioned parallel to the axis of the antenna.



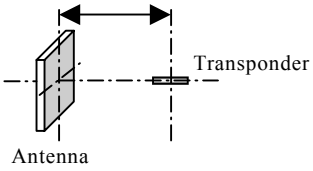
Perpendicular

The illustration shows the optimal position of the transponder if it is perpendicular to the axis of the antenna.



Perpendicular (frame antenna)

The illustration shows the optimal position of the transponder if it is perpendicular to the axis of the frame antenna.

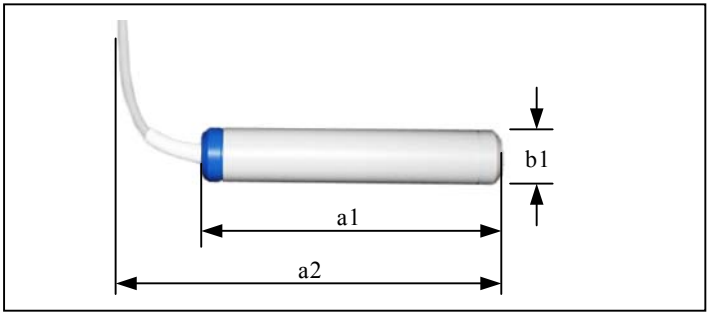


4.5.2 Available Antenna Types

For the antennas that are available, see chapter „Accessories“, page 68).

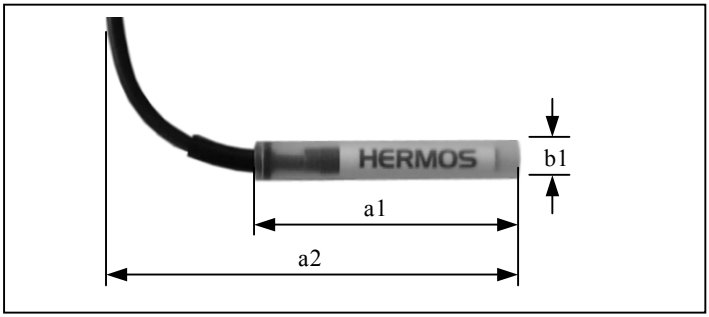
4.5.3 Dimensions for Planning

4.5.3.1 Rod Antenna



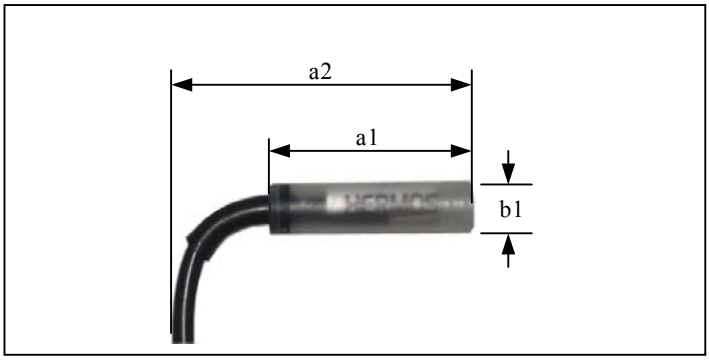
a1	Length of antenna cylinder	125mm / $4^{9}/_{10}$″
a2	Complete mounting dimensions (cable with 90° angle)	150mm / $5^{9}/_{10}$″
b1	Diameter of antenna cylinder	23.0mm / $^{9}/_{10}$″

4.5.3.2 Mini Antenna



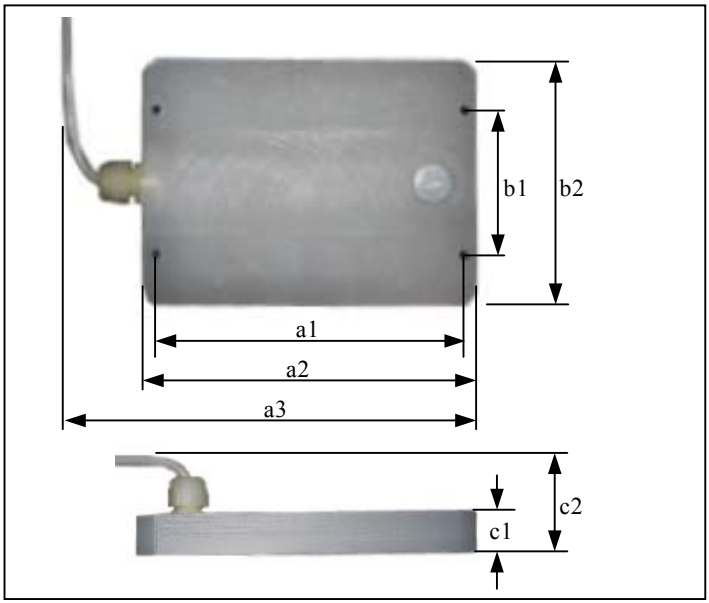
a1	Length of antenna cylinder	68mm / $2^{7}/_{10}$″
a2	Complete mounting dimensions (cable with 90° angle)	85mm / $3^{1}/_{3}$″
b1	Diameter of antenna cylinder	10.0mm / $^{2}/_{5}$″

4.5.3.3 Micro Antenna



a1	Length of antenna cylinder	40mm / $1^{3}/_{5}''$
a2	Complete mounting dimensions (cable with 90° angle)	60mm / $2^{2}/_{5}''$
b1	Diameter of antenna cylinder	10.0mm / $^{2}/_{5}''$

4.5.3.4 Frame Antenna



a1	Distance between the mounting holes (length)	148mm / $5^{9}/_{10}$″
a2	Length frame antenna	161mm / $6^{1}/_{3}$″
a3	Complete mounting dimensions length (cable screwing at the side)	210mm / $8^{1}/_{3}$″
b1	Distance between the mounting holes (width)	70mm / $2^{3}/_{4}$″
b2	Width frame antenna	120mm / $4^{3}/_{4}$″
c1	Height frame antenna	19mm / $^{3}/_{4}$″
c2	Complete mounting dimensions height (cable screwing at the top)	70mm / $2^{3}/_{4}$″

4.6 Connecting the Transponder Reader

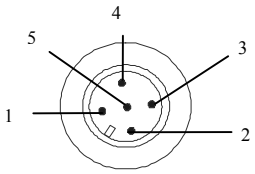
4.6.1 Antenna

Connect the antenna to the antenna plug (see illustration page 17).

4.7 Power Connection

Built-in male plug, plastic (power supply)

PIN	Signal
1	+24V
2	0V
3	NC
4	NC
5	NC



The device can be connected to an interior DC power circuit or to a DC adapter (see section “Accessories”, page 78).

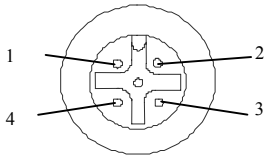
Note the required voltage (see technical data, page 21). Use cables, plugs and adapters provided by the manufacturer only!

Once the device is connected to the power supply, the power LED is illuminated (see illustration page 16). If it is not illuminated, see section 6 for help.

4.8 Terminal Connection

Built-in female plug, metal (RS232 interface #1)

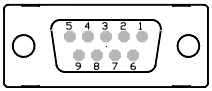
PIN	Signal
1	NC
2	GND
3	RxD
4	TxD

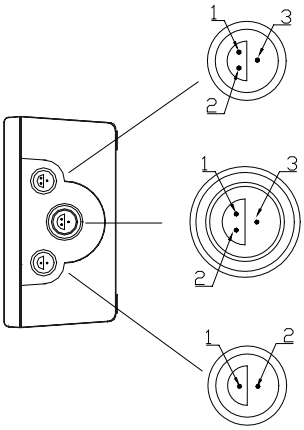


Sub-D female plug (RS232 interface #2)

The serial interface is also carried out with the Sub-D female plug (9 contacts); a serial connection line (switched 1:1) can be used.

PIN	DB9
1	NC
2	TXD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC





Ext. Input	
Pin	Signal
1	GND
2	+24V
3	IN npn

Sensor type:
GND
+ 24V DC
Output Q
positive logic

Floating contact

Antenna	
Pin	Signal
1	Antenna“+”
2	Antenna “-”
3	NC

Ext. Output	
Pin	Signal
1	+5V
2	OUT LED

The ext. output is dimensioned for connecting a LED (without resistor).

4.9 Starting Up

4.9.1 Required Operating Conditions

To operate the reader, the following requirements must be met:

- **An antenna must be connected correctly to the reader.**
- **The power supply must be connected.**
- **The transponder must be located within the individual reading/writing range of the antenna.**

4.9.2 Tuning

Before the reader can be operated, it must be calibrated so that it can communicate with the transponder.

Press the Tuning button (see illustration page 16). The Tuning LED lights up and goes out again. A blinking LED indicates a malfunction. See page 62 for details.

5 OPERATION

5.1 Operating Personnel

The RS232 Transponder Reader is designed to be operated by specially trained personnel only. If you have doubts about the qualification required, contact the manufacturer.

Operating the device without special skills can result in damage to the reader and/or connected devices!

5.2 Structure of Communication Protocol

General remarks:

- The communication will be done with ASCII - packages.
- Each reader represents a transponder reader with RS232-interface to which an address from 0 to E can be assigned. When the reader is delivered the address is 0.
- After each command to the reader a defined response is sent. We recommend to wait for this response before sending a new command.

5.2.1 Package Contents

Each package includes a package header (three signs), a message (two or more signs) and the end of package (five signs).

package header	message	end of package

5.2.2 Package Header

The header includes the start sign (one sign) and the package length (two signs).

package header		
start	length 1	length 2

start: ...start sign (ASCII-sign ´S´)

length 1: ...highbyte package length (hexadecimal) - ASCII-sign ´0´..´F´

length 2: ...lowbyte package length (hexadecimal) - ASCII- sign ´0´..´F´

The message length describes the number of character of a message.

5.2.3 Message Structure

The message includes a command, a target address and a source address as well as information.

message		
command	address	information

Command: ASCII-sign (refer to the 'Command' chapter)

Address: target/ source address; ASCII sign '0'...'E' for the reader [1)]

Information: depends on the command (includes none, one or more ASCII signs '0'...'F')

[1)] The reader is pre-assigned with 0 when delivered.

5.2.4 End of Package

The end of package includes an end sign (one sign) and a checksum (four signs).

end of package				
end	checksum 1	checksum 2	checksum 3	checksum 4

End: end sign ASCII sign no. 13 (hexadecimal 0D)

Checksum 1: highbyte – XOR logic of all data (package header, message and end sign); ASCII ‘0’..’F’

Checksum 2: lowbyte – XOR logic of all data (package header, message and end sign); ASCII ‘0’..’F’

Checksum 3: highbyte - addition of all data (package header, message and end sign); ASCII ‘0’..’F’

Checksum 4: lowbyte - addition of all data (package header, message and end sign); ASCII ‘0’..’F’

5.3 Commands of Protocol

5.3.1 Commands Terminal to Reader

Command	Description
’r’	acknowledge after reading a page (automatically read)
‘X’	start an externally triggered read
‘W’	write tag
‘G’	require parameter
‘P’	change parameter
‘H’	start heartbeat
‘N’	start software reset
‘a’	acknowledge to the ‘carrier removed’ command
‚L‘	lock one page
’I’	set tuning
’J’	interrogate tuning
’V’	version query

5.3.2 Commands Reader to Terminal

Command	Description
‘R’	data from a page (automatically read)
‘x’	data from a page (externally triggered read)
‘w’	response after write to tag
‘p’	response during parameter setting
‘g’	response to read parameters
‘h’	response after heartbeat
‘n’	response after software or hardware reset
‘e’	failure message
‘A’	carrier removed from equipment I/O port (presence sensor)
‚l‘	feedback at locking of one page
’i’	acknowledgement when setting the tuning
’j’	acknowledgement when interrogating the tuning
’v’	acknowledgement of the version query

5.3.3 Hardware Reset

If the power at the device had been turned on (hardware reset) the terminal will be informed about it.

terminal	direction	reader
	⇦	package head
	⇦	‘n’ command
	⇦	‘0’...’E’ source address
	⇦	package end

5.3.4 External Input Triggers Reading of the Tag

The reading is automatically triggered by a sensor respectively floating contact connected to the external input. Depending on the readmode configuration (parameter 1: *readmode*) the reader will read the following pages:

readmode = page (0): sequential read for different pages (parameter 2: readpage)

readmode = tag (1): read a tag until the end sign (‘E’ - end sign or ‘F’ empty) in IDbit0…3

readmode = whole (2): read the whole tag (all pages)

terminal	direction	reader
	⇦⇦	package header
	⇦	‘R’ command
	⇦	‘0’..’E’ source address
	⇦	‘01...’17’ page
	⇦	‘0’...’F’ ID bit 60..63
	⇦	‘0’...’F’ ID bit 56..59
	⇦	‘0’...’F’ ID bit 52..55
	⇦	‘0’...’F’ ID bit 48..51
	⇦	‘0’...’F’ ID bit 44..47
	⇦	‘0’...’F’ ID bit 40..43
	⇦	‘0’...’F’ ID bit 36..39
	⇦	‘0’...’F’ ID bit 32..35
	⇦	‘0’...’F’ ID bit 28..31
	⇦	‘0’...’F’ ID bit 24..27
	⇦	‘0’...’F’ ID bit 20..23
	⇦	‘0’...’F’ ID bit 16..19
	⇦	‘0’...’F’ ID bit 12..15
	⇦	‘0’...’F’ ID bit 8..11
	⇦	‘0’...’F’ ID bit 4..7
	⇦	‘0’...’F’ ID bit 0..3
	⇦⇦	package end
package header	⇨⇨	
command ‘r’	⇨	
target address ‘0’..’E’	⇨	
package end	⇨⇨	

Reading more pages (readmode “tag” or “whole”): protocol will be repeated. The end sign includes the command ‘R’ and the source address ‘0’...’E’

No acknowledge from the terminal: information will be repeated with following parameters (parameter 5: RS232 *delay time*; parameter 6: RS232 *maxrepeat*)

Reading not possible: repeated read - time frame (parameter 3: *r/w delay time*; parameter 4:r/w *maxrepeat*).

Reading not possible again: tag sends a failure message *no tag* (4) to the terminal.

The delay time for the presence sensor is configurable (parameter 0: *sensor delay*)

An automatic reading is only possible if all messages that have to be confirmed had been confirmed by the previous read or if the waiting period (rs232 repeattime) is expired after the last sending (rs232 maxrepeat).

If the sensor check is activated the circuit state of the floating contact connected to the external input is checked before a read-process triggered by the terminal. If it is not connected, the error message “NOTAG” is sent, otherwise the read-process is started.

5.3.5 Terminal Triggers Reading of the Tag

The read is initiated by the terminal via command ‚X'. On the basis of the transfer value you are able to configure whether the whole tag or only a certain page is read.

Value	Description
'01' to '17'	read page#
'98'	read more pages until end sign or empty sign
'99'	read whole tag

terminal	direction	reader
package header	⇨ ⇨	
command 'X'	⇨	
target address '0'..'E'	⇨	
value i.e.'05'	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	'x' command
	⇦	'0'.. 'E' source address
	⇦	i.e.: '05' page
	⇦	'0'.. 'F' ID bit 60..63
	⇦	'0'.. 'F' ID bit 56..59
	⇦	'0'.. 'F' ID bit 52..55
	⇦	'0'.. 'F' ID bit 48..51
	⇦	'0'.. 'F' ID bit 44..47
	⇦	'0'.. 'F' ID bit 40..43
	⇦	'0'.. 'F' ID bit 36..39
	⇦	'0'.. 'F' ID bit 32..35
	⇦	'0'.. 'F' ID bit 28..31

	⇦	'0'.. 'F' ID bit 24..27
	⇦	'0'.. 'F' ID bit 20..23
	⇦	'0'.. 'F' ID bit 16..19
	⇦	'0'.. 'F' ID bit 12..15
	⇦	'0'.. 'F' ID bit 8..11
	⇦	'0'.. 'F' ID bit 4..7
	⇦	'0'.. 'F' ID bit 0..3
	⇦ ⇦	package end

There is no acknowledge from the terminal.

In case of read request for more than one page (value 98 or 99) the protocol will be repeated. For the end sign the reader sends an additional package; the message includes the command 'x' and the source address '0'...'E'.

If the reading fails the reading will be repeated (parameter 3: *r/w delay time*; parameter 4: *r/w maxrepeat*). If it fails again the reader sends a failure message '*no tag*(4)' to the terminal.

If the sensor check is activated the circuit state of the floating contact connected to the external input is checked before a read-process triggered by the terminal. If it is not connected, the error message "NOTAG" is sent, otherwise the read-process is started.

5.3.6 Write Tag

The terminal will send following information to the reader with the corresponding target address: page# and data.

terminal	direction	reader
Package header	⇨ ⇨	
command ‘W’	⇨	
target address ‘0’..’E’	⇨	
page ‘01’.. ‘17’	⇨	
‘0’.. ‘F’ ID bit 60..63	⇨	
‘0’.. ‘F’ ID bit 56.. 59	⇨	
‘0’.. ‘F’ ID bit 52..55	⇨	
‘0’.. ‘F’ ID bit 48..51	⇨	
‘0’.. ‘F’ ID bit 44..47	⇨	
‘0’.. ‘F’ ID bit 40..43	⇨	
‘0’.. ‘F’ ID bit 36..39	⇨	
‘0’.. ‘F’ ID bit 32..35	⇨	
‘0’.. ‘F’ ID bit 28..31	⇨	
‘0’.. ‘F’ ID bit 24..27	⇨	
‘0’.. ‘F’ ID bit 20..23	⇨	
‘0’.. ‘F’ ID bit 16..19	⇨	
‘0’.. ‘F’ ID bit 12..15	⇨	
‘0’.. ‘F’ ID bit 8....11	⇨	
‘0’.. ‘F’ ID bit 4 7	⇨	
‘0’.. ‘F’ ID bit 0 3	⇨	
Package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	‘w’ command
	⇦	‘0’..‘E’ source address
	⇦ ⇦	package end

If ‘write tag’ fails writing will be repeated in the defined time frame (parameter 3: *r/w delay time*; parameter 4*: r/w maxrepeat*). If it fails again the reader sends a failure message ‘*no tag*(4)’ to the terminal.

If the sensor check is activated the circuit state of the floating contact connected to the external input is checked before a write-process triggered by the terminal. If it is not connected, the error message “NOTAG” is sent, otherwise the write-process is started.

5.3.7 Parameter Settings

The following parameters can be changed:

Para-meter #	Name	Description	Valid Values
0	sensor delay	operation delay for the presence sensor	‘01’.. ‘99’ ($^{1}/_{10}$ s)
1	readmode	readmode for automatic read triggered by external input	‘00’ only one page read ‘01’ read to end sign or empty sign[3)] ‘02’ all pages ‘10’ read only one page check sensor first[2)] ‘11’ up to end/empty sign check sensor first[2) 3)] ‘12’ all pages check sensor first[2)] ‘99’ deactivate sensor
2	readpage	page for readmode ‘00’	‘01’.. ‘17’
3	r/w repeattime	time between two	‘01’.. ‘99’ ($^{1}/_{10}$ s)

		readings or writings	
4	r/w maxrepeat	max. number of tries to read or write	'01'.. '99'
5	RS232 repeattime	waiting period[1)] for a confirmation; if no confirmation has been received, the message will be repeated (see RS232 maxrepeat)	'01.. '99' ($^1/_{10}$s)
6	RS232 maxrepeat	max. numbers of tries to send data to the terminal (RS232)	'00' (never ending) '01'.. '99'
7	watchport	message to the terminal that the floating contact connected to the external input has been opened	'00' not activated '01' activated
F	reader address	currently adjusted address of the reader Default: 0 ≙ '00'	'00'..'14' ≙ 0 .. E

terminal	direction	reader
Package header	⇨ ⇨	
command 'P'	⇨	
target address '0'..'E'	⇨	
parameter # '0'..'7'; 'F'	⇨	
value '00'..'99'	⇨	
Package end	⇨⇨	

	⇦ ⇦	package header
	⇦	‘p’ command
	⇦	‘0’.. ‘E’ source address
	⇦ ⇦	package end

[1] During the waiting period no new actions (for example reading or writing) can be started.

[2] If the sensor check is activated (first byte is 1) the circuit state of the floating contact connected to the external input is checked before a read- or write-process triggered by the terminal. If it is not connected, the error message “NOTAG” is sent, otherwise the read- respectively write-process is started.

[3] ‘E’ respectively ‘F’ in IDBit0…3 of the reading ID.

5.3.8 Query of the Current Parameters

terminal	direction	reader
package header	⇨ ⇨	
command ‘G’	⇨	
target address ‘0..E’	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘0’ value number
	⇦	‘01’.. ‘99’ value
	⇦ ⇦	package end

	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘1’ value number
	⇦	‘00’.. ‘02’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘2’ value number
	⇦	‘01’.. ‘17’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ [1)] source address
	⇦	‘3’ value number
	⇦	‘01’.. ‘99’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘4’ value number
	⇦	‘01’.. ‘99’ value
	⇦ ⇦	package end

	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘5’ value number
	⇦	‘01’.. ‘99’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘6’ value number
	⇦	‘01’.. ‘99’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘7’ value number
	⇦	‘00’.. ‘01’ value
	⇦ ⇦	package end
	⇦ ⇦	package header
	⇦	‘g’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘F’ value number
	⇦	‘00’.. ‘14’ value
	⇦ ⇦	package end

	⇦ ⇦	package header
	⇦	‘g’[2)] command
	⇦	‘0’.. ‘E’ source address
	⇦ ⇦	Package end

[2)] end sign includes the command ‘g’ and the source address ‘0’..’E’

5.3.9 Heartbeat

This command offers the possibility to find out from the terminal whether the connection to the reader is still activated.

terminal	direction	reader
package header	⇨ ⇨	
Command ‘H’	⇨	
target address ‘0’..’E’ [1)]	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	‘h’ command
	⇦	‘0’..’E’ [1)] source address
	⇦	‘0000’...’FFFF’ reader ID
	⇦	’0000’ return code
	⇦ ⇦	package end

Meaning of the reader ID:

Every reader has an unique 16 bit reader ID after installation. Every ID is only used once.

[1)] Because of compatibility to separated systems the heartbeat is also allowed with the address ‘F’.

5.3.10 Reset of Separate Devices

The command carries out a hard- and software reset in the reader.

terminal	direction	reader
package header	⇨ ⇨	
command ‘N’	⇨	
target address ‘0’..’E’	⇨	
package end	⇨ ⇨	
	⇦⇦	package header
	⇦	‘n’ command
	⇦	‘0’.. ‘E’ source address
	⇦⇦	package end

5.3.11 External Input had been changed

If the reader’s parameter *watchport* is activated (‘01’), the reader will report to the terminal that the signal from the external input (for example floating contact was opened) had been changed.

terminal	direction	reader
	⇦⇦	package header
	⇦	‘A’ command
	⇦	‘0’.. ‘E’ source address
	⇦⇦	package end
package header	⇨ ⇨	
command ‘a’	⇨	
target address‘0’..’E’	⇨	
package end	⇨ ⇨	

If the terminal does not send an acknowledge, the message will be repeated (value 6: *RS232 maxrepeat*) in the defined time frame (value 5: *RS232 delay time*).

5.3.12 Failure Codes

The failure codes have following meanings:

Failure Code	Name	Description
0	none	without failure
1	auto fail	automatic reading is not possible[1) 2)]
2	ex fail	read or write initiated from the terminal respectively other actions cannot be carried out [1) 2)]
3	write fail	data transfer to the tag not possible[1) 2)]
4	no tag	no tag or antenna installed
5	invalid	invalid parameter or command
6	unknown	unknown failure
7	unconfig	the device is not configured
8	check	parity or/ and checksum failure
9	void ackn	no valid acknowledge
A	locked	*Locked Page* cannot be written
:	msg len	message too long
;	invalid	invalid parameter or command
B	no ackn	the message which has to be confirmed has been sent maximally (rs232 maxrepeat) and has not been confirmed by the terminal within the defined time frame (see parameter 5)

terminal	direction	reader
	⇦⇦	package header
	⇦	‘e’ command
	⇦	‘0’.. ‘E’ source address
	⇦	‘0’..’B’ failure code
	⇦⇦	package end

[1] because the device is still busy

[2] or because a message has not been confirmed by the previous read up to now

5.3.13 Locking of the Tag

The terminal hands over the reader its address and the page number which shall be locked.

terminal	direction	reader
package header	⇨ ⇨	
Command ‘L’	⇨	
target address ‘0’..’E’	⇨	
page ‘01’.. ‘17’	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	‘l’ command
	⇦	‘0’..‘E’ source address
	⇦ ⇦	package end

If the page of the transponder could not be locked, the writing action will be repeated in a defined time frame (parameter 3: *r/w delaytime*) (parameter 4: *r/w maxrepeat*).

If the page still could not be locked, a failure message *NoTag* (4) is sent to the terminal. If the page was already locked, the successful feedback follows just like at the first locking.

If the sensor check is activated the circuit state of the floating contact connected to the external input is checked before a lock-process triggered by the terminal. If it is not connected, the error message "NOTAG" is sent, otherwise the lock-process is started.

☞ **Attention: A locked page can not be unlocked. This page is locked forever!**

5.3.14 Set Tuning of the TIRIS – RF - Module

The terminal delivers the reader the parameter of the capacitors C_0 to C_5 for the calibration of the antenna.

A bit is reserved for each capacitor, which shows its circuit state.

- 0 for not connected
- 1 for connected

Bit 2^0 here stands for the capacitor C_0.

terminal	direction	Reader
package header	⇨ ⇨	
command 'I'	⇨	
target address '0'..'E'	⇨	
C_0 to C_5 '00'.. '40'	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	'i' command
	⇦	'0'..'E' source address
	⇦ ⇦	package end

Parameter structure from C_0 to C_5 (also valid for 3.15):

hex.-value	bin.-value	Meaning
00	0000 0000	no capacitor is set
3F	0011 1111	all capacitors are set
40	**0100 0000**	**triggering of the automatic calibration**

For the calibration of the antenna **exclusively parameter ‚40'** (automatic calibration) should be used as in this case the antenna sends and receives optimally, that means with maximal range.

For special cases (for example reading- and writing-range shall be reduced) it can be necessary that the efficiency of the antenna has to be reduced by connecting or disconnecting single capacitors. But this should be carried out only by qualified staff.

If no reasonable calibration is found, the failure "Invalid" will be sent instead of the confirmation, and all jumpers will be set.

5.3.15 Query the Calibration of the TIRIS – RF - Module

The currently set capacitors can be queried with this function. The answer contains the currently set capacitors in hexadecimal format.

The structure corresponds to the one in 5.3.14.

terminal	direction	reader
package header	⇨ ⇨	
command 'J'	⇨	
target address '0'..'E'	⇨	
package end	⇨ ⇨	

	⇦ ⇦	package header
	⇦	'j' command
	⇦	'0'..'E' source address
	⇦	'00'.. '3F' C_0 to C_5
	⇦ ⇦	package end

Structure of C_0 to C_5:

hex.-value	bin.-value	meaning
00	0000 0000	no capacitor is set
3F	0011 1111	all capacitors are set

5.3.16 Interrogate Version

With this function the program-ID can be queried. The program-ID consists of 8 signs which are stored in ASCII-code.

terminal	direction	reader
package header	⇨ ⇨	
command 'V'	⇨	
target address '0'..'E'	⇨	
package end	⇨ ⇨	
	⇦ ⇦	package header
	⇦	'v' command
	⇦	'0'..'E' source address
	⇦	'00..FF' 1. ASCII
	⇦	'00..FF' 2. ASCII
	⇦	'00..FF' 3. ASCII
	⇦	'00..FF' 4. ASCII
	⇦	'00..FF' 5. ASCII
	⇦	'00..FF' 6. ASCII
	⇦	'00..FF' 7. ASCII
	⇦	'00..FF' 8. ASCII
	⇦ ⇦	package end

Example (S12v0525356312E302E31,1ABC):

command	values 1 to 8							
v0	52	53	56	31	2E	30	2E	31
answer	R	S	V	1	.	0	.	1

5.4 Examples for Packages

ASCII	HEX	Description
'S'	53	start sign
'0'	30	highbyte message length
'2'	32	lowbyte message length
'H'	48	first sign message: value
'0'	30	second sign message: target address
CR	0D	end sign
'2'	32	highbyte checksum XOR
'4'	34	lowbyte checksum XOR
'3'	33	highbyte checksum addition
'A'	41	lowbyte checksum addition

Calculation for the XOR checksum:

53 *XOR* 30 *XOR* 32 *XOR* 48 *XOR* 30 *XOR* 0D = **24** ⇨ '2' '4'

Calculation for the addition checksum:

53 + 30 + 32 + 48 + 30 + 0D = 13A

Only low significant byte will be used: ⇨ 3A ⇨ '3' 'A'

Other example:

ASCII (‘.’ = CR)	Description
S02r0.1E64	read confirmation reader0
S05P0101.0BD7	setting readmode reader0 on *tag*
S04X001.33AD	explicit read reader0 page 1
S04X098.33BD	explicit read reader0 *tag*
S04X099.32BE	explicit read reader0 *whole*
S02G0.2B39	question about parameter of reader0
S05P0701.0DDD	setting parameter reader0 *watchport* activated
S02a0.0D53	confirmation on ‚floating contact at the external input was opened‘
S02N0.2240	reset reader0

6 SERVICE AND ERROR HANDLING

6.1 General

- ☞ **The transponder reader and its components must be serviced by the manufacturer only.**
- ☞ **If errors occur, follow the instructions in this section. Do not carry out any error eliminating measures other than the ones described in this section.**
- ☞ **If you are uncertain about errors and their handling, contact the manufacturer (see the contact information on page 65 of this manual). Have the serial number of the transponder reader ready as shown on the label (see page 20) when contacting the manufacturer.**

6.2 Qualified Error Handling Personnel

Error handling shall be carried out by specially trained personnel only. If you are uncertain about the qualifications that are required, contact the manufacturer.

Error handling the device without the special skills required and unqualified interference with the device can result in personal injury and damage to the reader and/or connected devices!

6.3 Safety Instructions

All antenna resonant circuit components carry high voltages!

When replacement parts are required, use replacement parts specified by the manufacturer only. Unauthorized substitutions may result in fire, electric shock, or other hazards.

Static electricity can harm electronic components inside the device. ESD protection measures must be observed when opening the device (see page 11).

When removing the housing lid, note that the housing lid is connected to the case with a cable. Remove the lid carefully to prevent damage – do not pull it! Do not operate the device when the housing lid is removed!

Do not short-circuit the fuse. This may result in fire or damage to the device. When changing fuses, use fuses specified by the manufacturer only.

6.4 Errors Indicated by the LEDs

6.4.1 Power LED Not Illuminated

1. Check the power supply and the connection cables.
2. Remove the housing lid as described on page 28 and check if the second power LED inside the reader is illuminated (see illustration on page 17). If it is on, the outside power LED is defect. Contact the manufacturer.
3. If neither the outside LED nor the inside LED is illuminated, disconnect the device from the power supply and carefully remove the fuse (see illustration page 17). Test the fuse. If it is faulty, replace it by a fuse specified by the manufacturer.

If the above measures do not solve the problem, leave the reader disconnected and contact the manufacturer.

6.4.2 Error LED Illuminated (in Test Mode)

1 Press the tuning button.

4 If the tuning LED is not illuminated, the transponder is not within the reading/writing range of the antenna. Install the antenna closer to the transponder (see individual antenna ranges, page 69). If this does not solve the problem, contact the manufacturer.

2 If the tuning LED blinks,

- Check if the antenna is located too near to a strong metallic surrounding. Relocate the antenna with more distance.
- Check if the antenna and the antenna cable are connected correctly. Use another antenna cable if available.

If these measures do not solve the problem, contact the manufacturer.

6.5 Reader Does Not Respond or Transmit or Cannot be Controlled by the Host

1 Check if the interface connection cable is undamaged and correctly connected to both reader and host.

2 Check the status as indicated by the LEDs (see section 0).

3 Download the test software from the Internet (www.carmas.com → Products). Follow the instructions.

If these measures do not solve the problem, contact the manufacturer.

6.6 Reset

In the case of software errors, a power reset can be carried out by stopping and restarting the power supply.

After the reset, the reader implements a self-test. The self-test can continue up to five seconds. As the first step in these self-tests, all LEDs of the membrane keyboard light up. In the second step, the reader displays the key states of the membrane keyboard. If a LED is illuminated, the button specified is active. The output LED signalizes the SECS2 protocol. If the test was successful, all LEDs except the power LED, are extinguished.

6.7 Power Cut

After a power cut, the reader carries out a reset with self-test. The self-test can continue for up to five seconds. In the first step of these self-tests, all LEDs of the membrane keyboard are illuminated. In the second step, the reader displays the key states of the membrane keyboard. If a LED is on, the specified button is active. The output LED signalizes the SECS2 protocol.

If the test was successful, all LEDs, except for the power LED, are extinguished.

6.8 Software Releases

Release Date	Version	Description
10/27/2000	RIV2.1.0	First version. (without membrane keyboard)
11/21/2000	RIV2.2.0	
12/04/2000	RIV2.2.1	Some modifications for the firmware upgrade mode
03/06/2001	RIV2.3.0	First version with membrane keyboard
04/04/2001	RIV2.4.0	Some modifications for the firmware upgrade mode After reset the reader performs a keyboard test (this takes some time)
06/05/2001	RIV2.5.0	The capability to write to page 1 is enabled as default behavior
06/22/2001	RIV2.5.1	Tuning button is enabled in every mode
09/04/2001	RIV2.6.0	On software reset no keyboard test will be performed While the hardware reset is performing the keyboard test, the Input LED indicates the reader protocol
09/17/2001	RIV2.6.1	No protocol changes
10/25/2001	RIV2.6.2	Increased reading and writing ranges
06/05/2002	RIV2.7.0	Tag can be read and written in normal mode (8 bytes data and 2 bytes checksum per page) or in free mode (10 bytes data without checksum per page)

6.9 Customer Service

BROOKS Automation (Germany) GmbH
RFID Division
Gartenstraße 19
D-95490 Mistelgau
Germany
Tel: +49 9279 991 910
Fax: +49 9279 991 900
E-mail: rfid.support@brooks.com
24 hour technical support hotline (Brooks): +1 978 262 2900

7 DEINSTALLATION AND STORAGE

7.1 Deinstallation

1. Disconnect the power supply.
2. Disconnect all cables.
3. Loosen and remove the mounting screws.
4. Remove the reader from its installation surface.

7.2 Storage

Store the reader and its components in a clean and dry environment with the power supply disconnected. Make sure the contacts remain clean. Observe the necessary storage conditions (for technical data, see page 20).

8 TRANSPORTATION AND DISPOSAL

8.1 Transportation

For transportation purposes such as mailing, use a firm cardboard box. Use adequate padding material to protect the device on all sides.

8.2 Disposal

The transponder reader and its components consist of different materials. Dispose of these materials separately in accordance with the relevant legislation in your country. Do not throw them away with everyday household trash.

Separate the interior electronic components from the case. Dispose of

- The case as plastic trash
- The electronic components, antennas and cables as electronic trash.

9 ACCESSORIES

9.1 Antennas

(Special antenna types are available on request)

9.1.1 Available Types

Type	Part-No.	Picture
Micro antenna (xx = cable length)	ANT-1Mxx	
Mini antenna (xx = cable length)	ANT-1Kxx	
Rod antenna (xx = cable length)	ANT-1Sxx	
Frame antenna (xx = cable length)	ANT-1Rxx	

xx = cable length	05 → 500 mm ($19^{2}/_{3}''$)
	10 → 1000 mm ($39^{1}/_{3}''$)
	20 → 2000 mm ($78^{3}/_{4}''$)
	30 → 3000mm ($118^{1}/_{10}''$)
	and so on

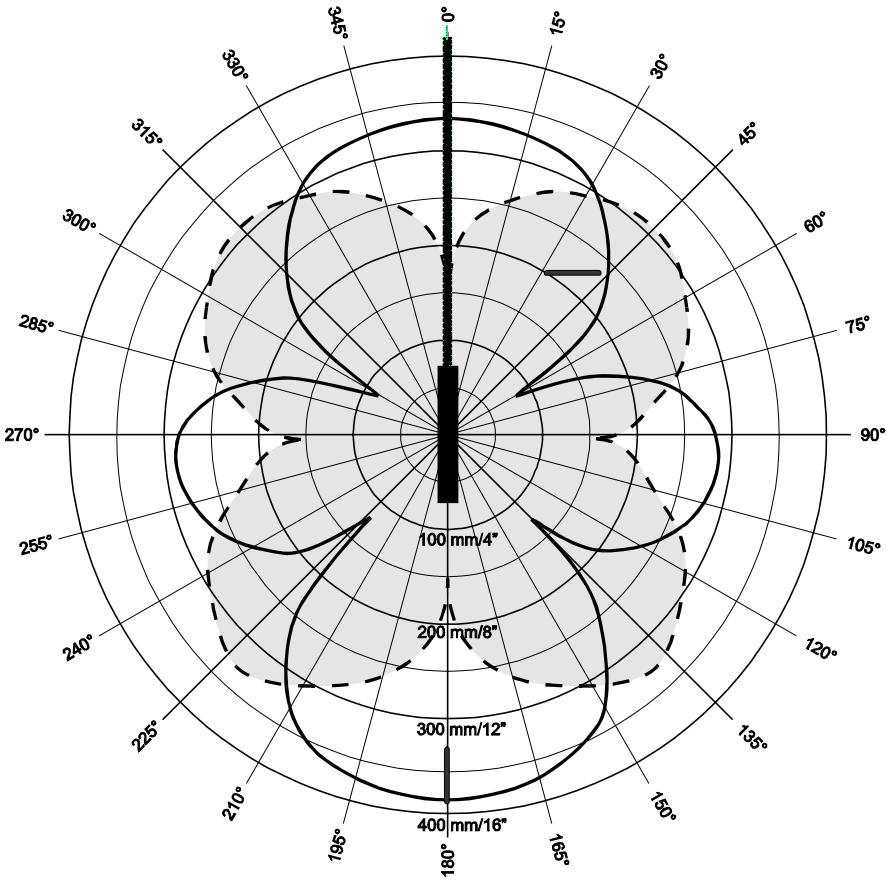
9.1.2 Reading and writing Ranges

9.1.2.1 Reading Range Rod Antenna

Transponder: 32 mm / $1^1/_4$″ glass transponder (read only, read/write, multipage).

If you use a multipage transponder, this diagram is valid for page 1 of the multipage transponder only.

Antenna: BROOKS rod antenna (up to 1000mm / $39^1/_3$″ lead)



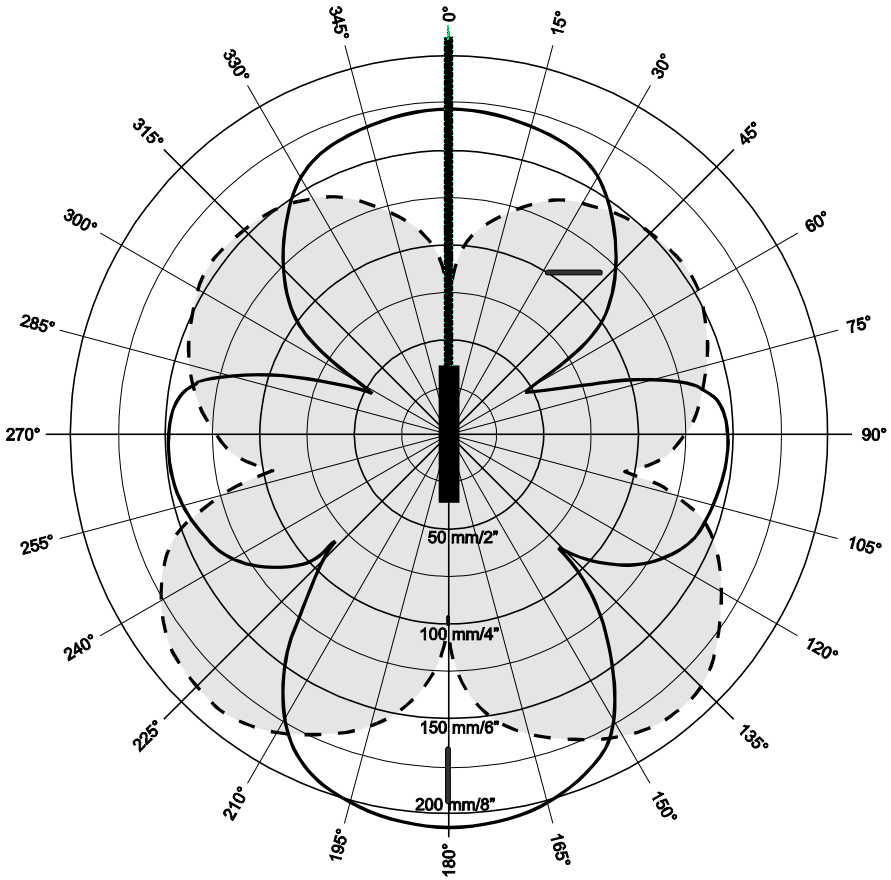
_____ Transponder parallel to antenna

- - - - - - - - Transponder 90° to antenna

9.1.2.2 Writing Range Rod Antenna

Transponder: 32 mm / $1^1/_4$″ multipage glass transponder

Antenna: BROOKS rod antenna
(up to 1000mm / $39^1/_3$″ lead)



_____ Transponder parallel to antenna

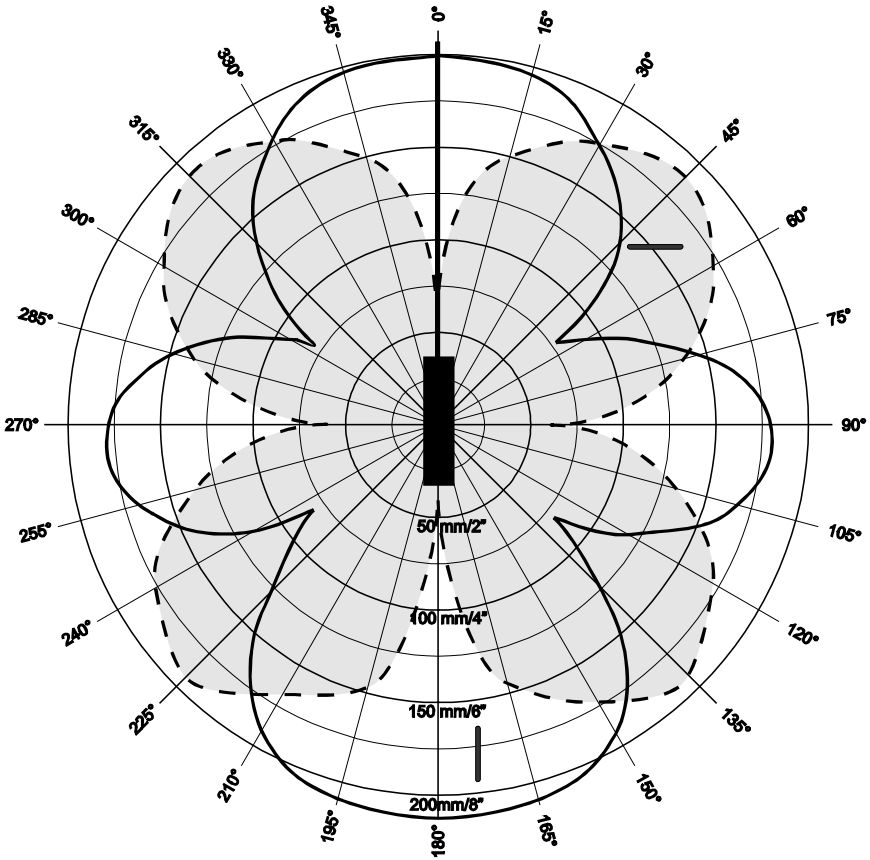
- - - - - - - - Transponder 90° to antenna

9.1.2.3 Reading Range Mini Antenna

Transponder: 32 mm / $1^1/_4$″ glass transponder (read only, read/write, multipage).

If you use a multipage transponder, this diagram is valid for page 1 of the multipage transponder only.

Antenna: BROOKS mini antenna (up to 1000mm / $39^1/_3$″ lead)



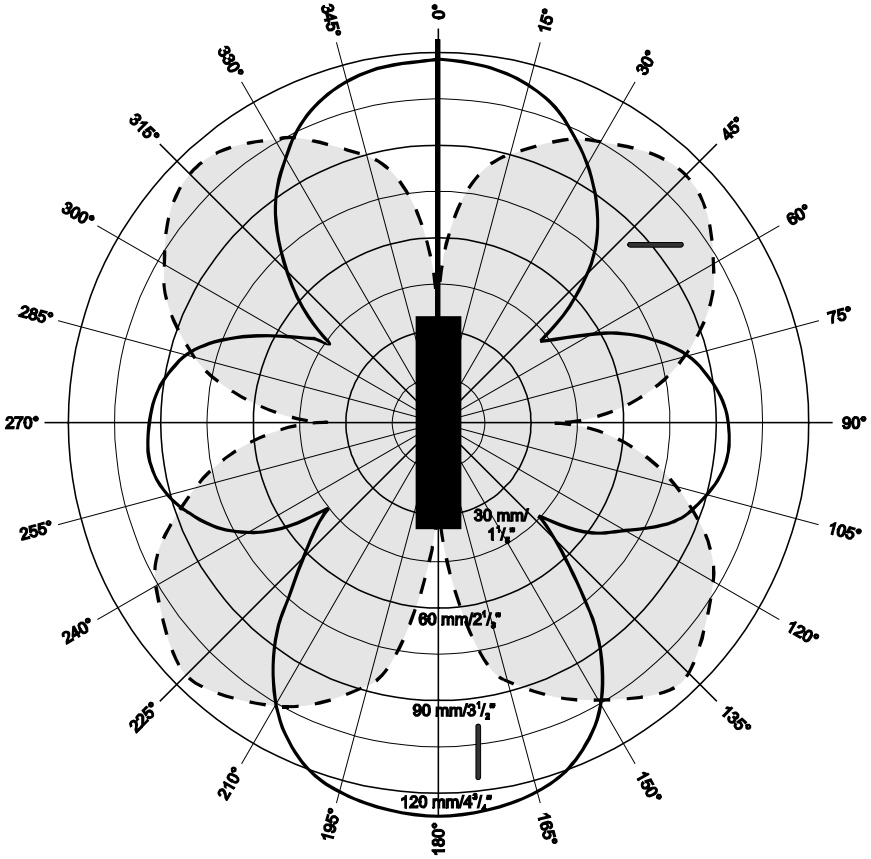
_____ Transponder parallel to antenna

- - - - - - - - Transponder 90° to antenna

9.1.2.4 Writing Range Mini Antenna

Transponder: 32 mm / $1^1/_4$″ multipage glass transponder

Antenna: BROOKS mini antenna
(up to 1000mm / $39^1/_3$″ lead)



_____ Transponder parallel to antenna

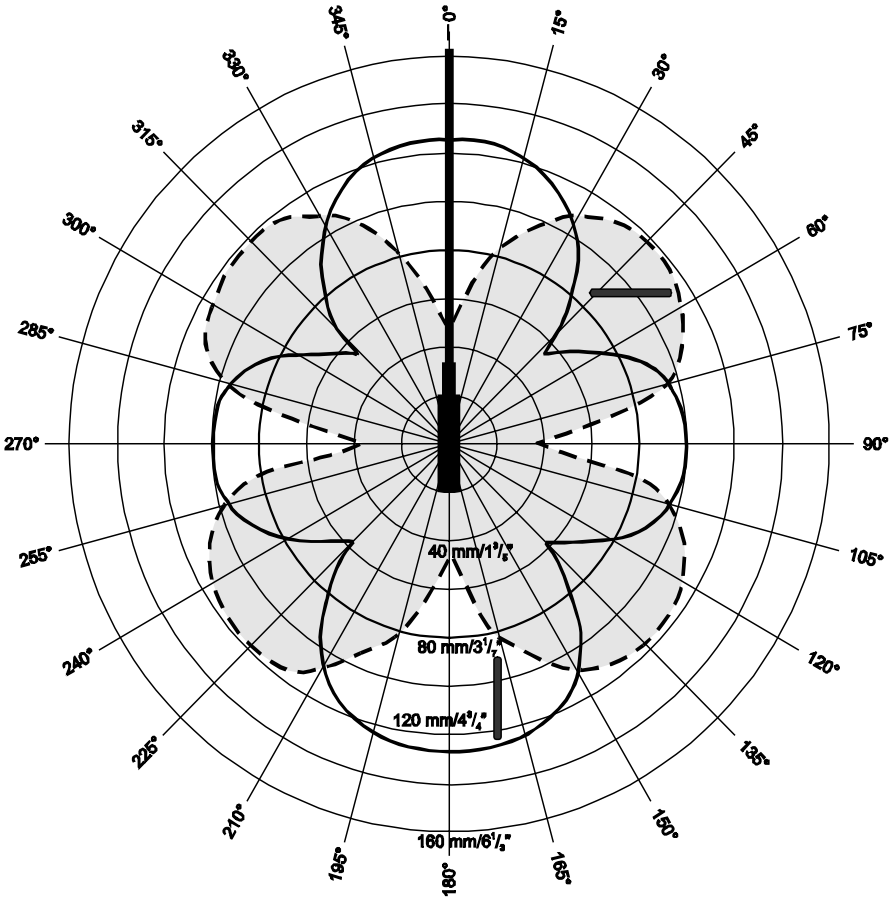
- - - - - - - - Transponder 90° to antenna

9.1.2.5 Reading Range Micro Antenna

Transponder: 32 mm / $1^1/_4$″ glass transponder (read only, read/write, multipage)

If you use a multipage transponder, this diagram is valid for page 1 of the multipage transponder only.

Antenna: BROOKS micro antenna
(up to 1000mm / $39^1/_3$″ lead)



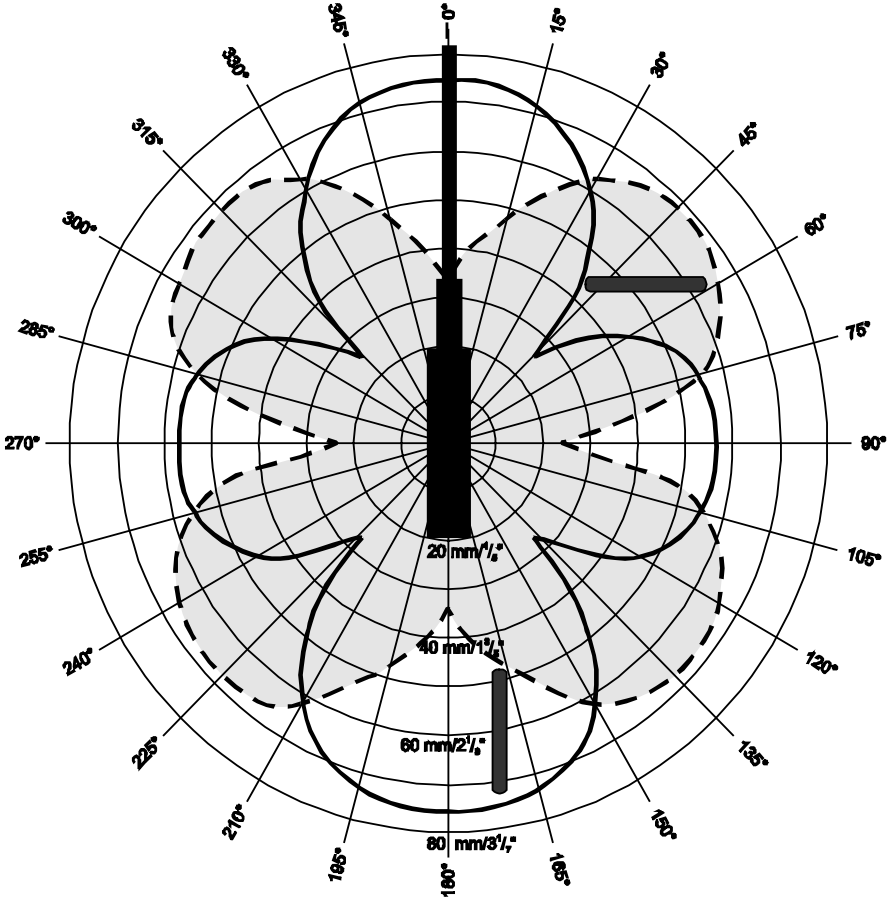
_____ Transponder parallel to antenna

- - - - - - - - Transponder 90° to antenna

9.1.2.6 Writing Range Micro Antenna

Transponder: 32 mm / $1^1/_4$″ multipage glass transponder

Antenna: BROOKS micro antenna
(up to 1000mm / $39^1/_3$″ lead)



_____ Transponder parallel to antenna

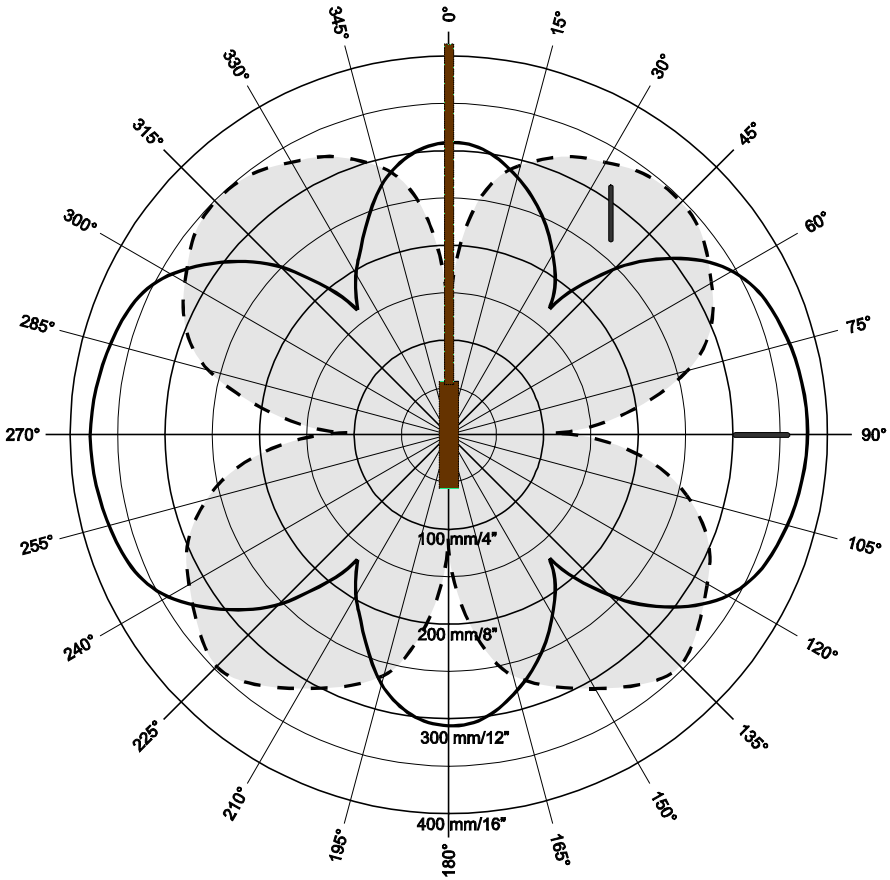
- - - - - - - - Transponder 90° to antenna

9.1.2.7 Reading Range Frame Antenna

Transponder: 32 mm / $1^1/_4$″ glass transponder (read only, read/write, multipage)

If you use a multipage transponder, this diagram is valid for page 1 of the multipage transponder only.

Antenna: BROOKS frame antenna
(up to 1000mm / $39^1/_3$″ lead)



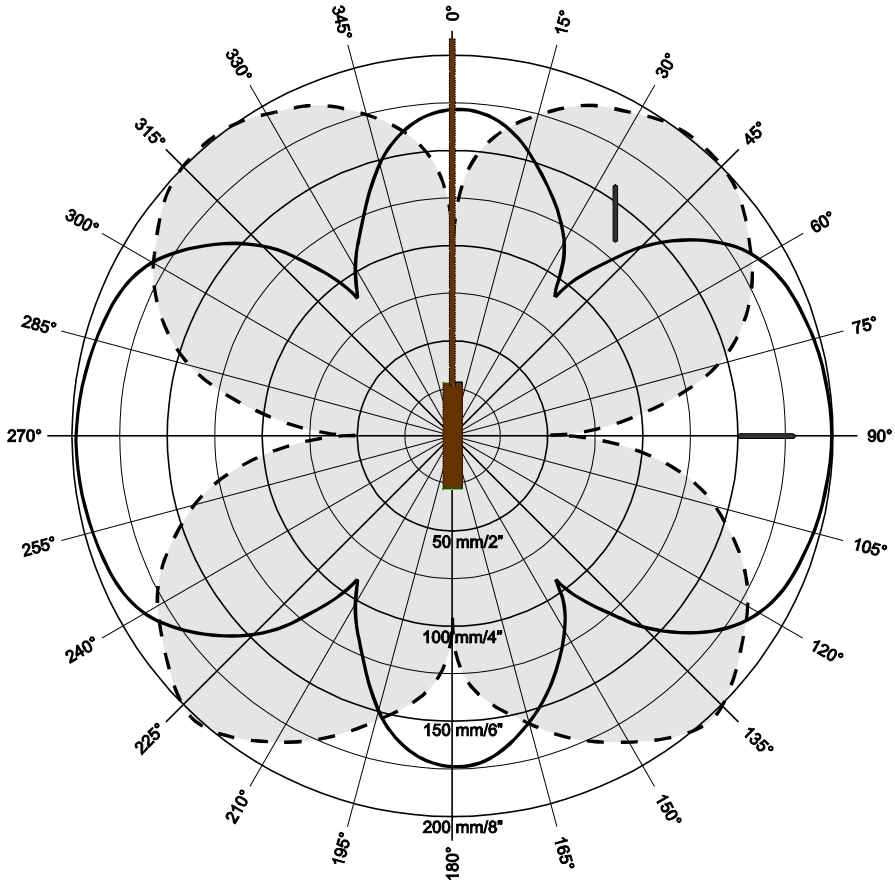
_____ Transponder parallel to antenna

- - - - - - - - Transponder 90° to antenna

9.1.2.8 Writing Range Frame Antenna

Transponder: 32 mm / $1^1/_4$″ multipage glass transponder

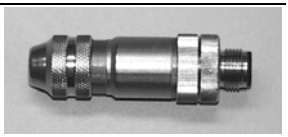
Antenna: BROOKS frame antenna
(up to 1000mm / $39^1/_3$″ lead)



_____ Transponder parallel to antenna

- - - - - - - - Transponder 90° to antenna

9.2 Plugs

Type	Part-No.	Picture
Female power plug, straight	KBV-GK	
Female power plug, angled	KBV-WK	
Shielded male plug, straight (RS232)	KSRS-GM	
Cable plug, ext. sensor, metal	KS-SENS1	
Cable plug, ext. output, metal	KS-LED1	

9.3 Cables

Type	Part-No.	Picture
Serial cable (cable length: 1000 mm / $39^{1}/_{3}''$)	RSK9-10	
Power supply cable (cable length: 1000 mm / $39^{1}/_{3}''$)	KBV24-10	

9.4 Power Supply

Type	Part-No.	Picture
Power supply 1.5A (IN: 110/230V OUT: 24VDC)	SVG1.5	